



TECHNICAL SCOPE OF WORK FOR DESTRUCTIVE TESTING OF GI PIPE, GI FITTINGS and NON-FERROUS ITEMS

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1. INTRODUCTION

Gujarat Energy Limited (GEL) (hereinafter also referred as “owner” / “buyer”) is a Government of Gujarat undertaking and currently is India’s largest City Gas Distribution Company with its presence spread across 41 districts in the state of Gujarat, Rajasthan, Madhya Pradesh, Haryana, Punjab, Maharashtra and Union Territory of Dadra & Nagar Haveli. GEL is committed to develop eco-friendly infrastructure and transportation fuel for public service in its operating areas as awarded by PNGRB from time to time.

The technical scope of this specification covers destructive testing of GI pipe, GI fittings and Brass items (Contractor procured material) as per GEL specifications.

2. CODES AND STANDARDS

- IS 10748 : Hot rolled steel plates, sheets and strips for welded tubes and pipes
- IS:1239 (Part-1) : Steel Tubes, Tubulars and other Wrought Steel Fittings – Specification
- IS 554 : Pipe threads where pressure-tight joints are made on the threads – dimensions, Tolerances and designation
- IS:4736 : Specification for Hot Dip Zinc coatings on Mild Steel Tubes
- IS 14329 : Malleable Iron Castings - Specification
- IS 1879 : Malleable Cast Iron Pipe Fittings – Specifications
- IS 4759 : Hot-dip zinc coatings on structural steel & other allied products – specification
- IS 319 : Free cutting brass bars, Rods and Section– Specification
- IS 1608 (Part-1) : Metallic Materials - Tensile testing at Room temperature
- IS 8811 : Method for Emission Spectrometric Analysis of Plain Carbon and Low Alloy Steels Point to Plane Technique
- IS 228 (Series) : Methods for Chemical Analysis of Steels
- IS 2329 : Metallic Materials – Tube (in Full Section) – Bend Test
- IS 12554 (Part-2) : Methods of Test for Metallic and Related Coatings – Coating Mass
- IS 6745 : Methods for Determination of Mass of Zinc Coating on Zinc-Coated Iron and Steel Articles
- IS 1500 (Part-1) : Metallic Materials – Brinell Hardness Test – Part 1: Test Method
- BS EN 15079 : Copper and Copper Alloys – Analysis by Spark Source Optical Emission Spectrometry (S-OES)

- IS 1501 (Part-1) : Metallic Materials – Vickers Hardness Test – Part 1: Test Method

3. STATUTORY REGULATIONS

Bidder shall be duly accredited by the National Accreditation Board for Testing & Calibration Laboratories (NABL), throughout the contract duration for chemical and mechanical testing facility.

If at any instance during contract duration, NABL accreditation period is over and same is not renewed, Bidder shall inform EIC immediately and cease all testing activities. In such scenario, Bidder will ensure inspection is carried out through other duly accredited/empanelled agency at no extra cost to GEL (which fulfils tendered requirements for Destructive testing and subject to prior approval of GEL EIC).

4. DEFINITION / GLOSSARY

Owner The Principal Requesting the Works to Which the Agreement relates i.e. "Gujarat Energy Limited".

Bidder/Contractor Shall mean the person or persons, firm or company whose Bid has been accepted by Gujarat Energy and includes the CONTRACTOR's legal representatives, his successors and permitted assigns.

5. CONTRACTOR'S SCOPE OF WORK

5.1 Tests to be carried out for GI Pipe & GI Fittings & Non-Ferrous Items:

5.1.1 Chemical composition of GI pipes shall conform to Grade-2 of IS 10748 and the requirements specified in table below:

Chemical Composition	Carbon	Manganese	Sulphur	Phosphorus
Max. % Allowable as per IS 10748-2025 for raw material	0.12%	0.80%	0.040%	0.040%
Max Permissible Variation over specified limit in % for product	0.02%	0.05%	0.005%	0.005%

5.1.2 Dimensions for **GI Pipe- Heavy** as per IS 1239 Part-1 shall comply with below table:

Nominal Bore	OD		Thickness	Mass of Tube
	Max	Min		
15 mm	21.8 mm	21.0 mm	3.2 mm (+ Not Limited/ -10%)	1.44 kg/mtr. (+ 10%; -10%)
25 mm	34.2 mm	33.3 mm	4.0 mm (+ Not Limited/ -10%)	2.93 kg/mtr (+ 10%; -10%)
Allowable Tolerances			+ Not Limited; -10%	+ 10%; -10%

5.1.3 Dimensions for GI Fitting as per IS-1879 shall comply with the requirements specified in below table.

Nominal Bore	Thickness	Mass
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15 mm	2.5 mm (+ Not Limited/ -0.5mm)	Calculate as per section-2, Table 4 of IS-1879
25 mm	3.0 mm (+ Not Limited/ -0.7mm)	

5.2 Test for Mechanical Properties:

- 5.2.1 **GI Pipe Tensile Strength:** Tensile strength of finished GI pipes shall conform to IS 1239 (Part 1), latest revision/amendment. The tensile strength of finished GI pipes shall be minimum 320 MPa unless otherwise specified in the latest applicable standard. The tensile test shall be carried out in accordance with IS 1608 (Part 1). For galvanized tubes, the zinc coating shall be removed prior to preparation/testing of the tensile specimen, as applicable.
- 5.2.2 **GI Pipe-Heavy Elongation:** Minimum elongation of finished GI pipes shall conform to IS 1239 (Part 1), latest revision/amendment. For 15 mm and 25 mm NB pipes, the minimum elongation shall be 20%, unless otherwise specified in the latest applicable standard.
- 5.2.3 **Bend Test:** GI pipes shall be subjected to the bend test in accordance with IS 2329 and shall comply with the requirements of IS 1239 (Part 1), latest revision/amendment. The pipes shall be capable of withstanding cold bending at 90° without showing any sign of fracture or failure. Radius at the bottom of the groove shall be equal to at least eight times the outside diameter of the tubes.
- 5.2.4 **Zinc Coating - GI Pipe:** The zinc coating of GI pipes shall conform to IS 4736, latest revision/amendment. The minimum mass of zinc coating, when determined on a 100 mm long test piece shall be 400 g/m². The mass of coating expressed in g/m² shall be calculated by dividing the total mass of zinc (inside plus outside) by the total coated surface area (inside plus outside).
- 5.2.5 **Re-Test:** If any one of the test pieces, first selected, fails to pass any of the tests specified above, two further samples shall be selected for testing in respect of each failure. If both these additional samples pass, material shall be deemed to comply with that particular test. If either of these additional samples fails, material shall be deemed not to comply with IS 1239 (Part-1) (GI Pipes only) and shall be rejected.
- 5.2.6 **Threads** shall be checked as per IS 554 latest revision/amendment.
- 5.2.7 **Test for GI fittings** shall be carried out in accordance with IS 14329 & IS 1879 latest revision/amendment. GI Fittings galvanized test results shall be as per the requirements of IS 4759 latest revision/amendment.
- 5.2.8 **Chemical composition of brass fittings** shall conform to IS-319 and shall comply with below table.

Chemical Constituent	Percentage, (Grade-1), Half Hard (HB)
Copper (Cu)	56.0 % to 59.0 %
Lead (Pb)	2.0 % to 3.5 %
Iron (Fe)	0.35 % Max

Other Impurities (Excluding Iron)	0.70 % Max
Zinc (Zn)	Remaining

5.3 Item wise test methods & applicable requirement standard are tabulated below:

Item	Description of test	Test Method	Requirement Standard
GI Pipe	Chemical by OES	IS 8811 / IS 228	IS 10748 (Grade-2) & IS 1239
	Tensile Strength & Elongation	IS 1608 Part-1	
	Bend Test	IS 2329	
	Thickness & OD	As per Lab SOP	
	Mass per Meter		
	Go-No Go Gauge for Thread		
	Coating Thickness of Galvanizing	IS 12554 Part-2	IS 4736
	Mass of zinc coating	IS 6745	
GI Nipple	Chemical by OES	IS 8811 / IS 228	IS 10748 (Grade-2)
	Thickness & OD	As per Lab SOP	IS 1239
	Go-No Go Gauge for Thread		IS 554
	Coating Thickness of Galvanizing	IS 12554 Part-2	IS 4736
	Mass of zinc coating	IS 6745	
GI Fittings (MCI)	Brinell Hardness Test	IS 1500: Part-1	IS 14329 Grade BM300 & IS 1879
	Thickness & Dimension	As per Lab SOP	
	Nominal Mass		
	Go-No Go Gauge for Thread		IS 554
	Coating Thickness of Galvanizing	IS 12554 Part-2	IS 4759
	Mass of zinc coating	IS 6745	
GI Clamp	Thickness & Dimension as per Drawing	As per Lab SOP	GGL-TS/PNG-TYP/GJ.CLAMP-035 & IS 4759
	Coating Thickness of Galvanizing	IS 12554 Part-2	
	Mass of zinc coating	IS 6745	
Brass Fittings	Chemical by OES	BS EN 15079	IS 319 Grade-1 Half Hard
	Vickers Hardness Test	IS 1501: Part 1	

Note: The Bidder shall carry out all tests in accordance with the latest revision/amendment of the applicable standards. In case of any change in the testing requirements due to subsequent revision/amendment of the standards, the requirements of the latest revision/amendment shall prevail and be complied with.

6. OWNER'S SCOPE OF SUPPLY

- Sampling: Samples required for testing shall be randomly selected from different batches/heat numbers, as applicable, from lots already inspected by TPI in accordance with the approved QAP. The selected samples shall be duly verified by TPI prior to dispatch for testing.

Item Category	Item/Size	Qty per test
GI Pipe	Pipe (15 mm)	1 Mtr
	Pipe (25 mm)	1+1 Mtr
GI Nipple	Nipple (½" or 1")	2 Nos
GI Fittings (MCI)	Elbow (½" or 1")	2 Nos
	Coupling (½" or 1")	2 Nos
	Tee (½" or 1")	2 Nos
GI Clamp	Pipe Clamp (½" or 1")	1 Set
Brass Items	Brass Meter Adaptor: NRV (Bush, Adaptor & Nut)	1 Set
	Brass Meter Adaptor: Non-NRV (Bush, Adaptor & Nut)	1 Set
	Isolation Ball Valve	1 No.
	Gas Tap	1 No.

- Coding of the samples: Each test sample shall be uniquely coded by respective Engineer In-charge (EIC) prior to dispatch to the testing agency. The coding shall ensure that the identity of the contractor/vendor and the site location remains undisclosed to the testing agency to maintain impartiality in the testing process.
- Transportation: Test samples are to be sent to the testing agency directly by Engineer-in-charge of the respective location.

7. SPECIFICATION OF WORK

- Bidder shall carry out the job as per the samples sent by Owner.
- Bidder shall prepare Test Report for each Pipe and fitting sample and submit to Owner as per applicable standards.

8. MODE OF MEASUREMENT

The bill shall be considered for payment only upon submission, verification and approval of the test certificates by the GEL Engineer-in-Charge and GA Head

9. INSPECTION

GEL reserves the right for inspection at any stage of any activity being executed by the Contractor under this Contract.

10. DOCUMENTS AND REPORTING

The Contractor shall submit all the testing reports in original after completion of all the testing activities.